

CLAIMS

1. A lithographic projection apparatus comprising:
 - a radiation system which provides a projection beam of radiation;
 - a patterning structure support to support a projection beam patterning structure which patterns the projection beam according to a desired pattern;
 - a substrate table to hold a substrate;
 - a projection system which projects the patterned beam onto a target portion of the substrate;
 - a support member constructed and arranged to support a portion of the lithographic projection apparatus; and
 - a vacuum chamber having a wall enclosing the support member, wherein the support member comprises:
 - a gas-filled pressure chamber, the gas in the pressure chamber acting on a movable member such as to at least partially counteract a force substantially parallel to the support direction, and
 - a gas evacuating structure constructed and arranged to evacuate gas escaping towards the vacuum chamber through a gap between the movable member and a bearing surface.
2. An apparatus according to claim 1, wherein the support member further comprises a rod connected to the movable member.
3. An apparatus according to claim 2, wherein the rod comprises a rigid part and a flexible part.
4. An apparatus according to claim 3, wherein the flexible part is positioned at an end of the rigid part.
5. An apparatus according to claim 4, wherein the flexible part is coupled to at least one of said movable member and said portion of the lithographic apparatus.

6. An apparatus according to claim 1, wherein the support member has a hollow part.

7. An apparatus according to claim 6, wherein a conduit is arranged through the hollow part.

8. An apparatus according to claim 1, wherein the support member supports at least one of the patterning structure support and the substrate table.

9. An apparatus according to claim 1, wherein the support member further comprises a bearing supporting the movable member and maintaining the gap between the movable member and the bearing surface, the bearing comprising a gas bearing constructed and arranged to provide pressurized gas into the gap thereby generating forces tending to hold the movable member away from the bearing surface, and the gas evacuating structure provided between the gas bearing and the vacuum chamber along the movable member so as to remove gas from the gap.

10. An apparatus according to claim 9, wherein the gas bearing comprises an elongate groove in one surface defining the gap; and a gas supply which supplies gas under pressure to said elongate groove.

11. An apparatus according to claim 1, wherein the gas evacuating structure comprises a conduit providing a fluid communication between the gap and at least one reservoir at a pressure higher than that of the vacuum chamber and lower than that of the gas to be removed from the gap.

12. An apparatus according to claim 11, wherein the conduit comprises at least one elongate groove in a surface defining the gap.

13. An apparatus according to claim 1, wherein the pressure relief structure includes a fluid communication between the gap and at least one vacuum pump.

14. An apparatus according to claim 13, wherein the fluid communication between the gap and the at least one vacuum pump comprises at least one elongate vacuum groove in a surface defining the gap.

15. (Amended) An apparatus according to claim 14, wherein the fluid communication comprises more than one elongated vacuum groove in the surface defining the gap, the vacuum grooves being generally parallel and each of the respective grooves being in communication with a progressively lower pressure vacuum in the direction of the vacuum chamber.

16. An apparatus according to claim 1, wherein a stiffness of the support member is such that a deformation force in the perpendicular direction by the support member due to a deformation of the support member in the perpendicular direction substantially counteracts an opposite displacing force in the perpendicular direction due to a force substantially parallel to the support direction acting on the support member.

17. An apparatus according to claim 1, wherein the patterning structure support comprises a mask table for holding a mask.

18. An apparatus according to claim 1, further comprising:
an isolated reference frame; and the support member is arranged to support the isolated reference frame.

19. An apparatus according to claim 1, wherein the radiation system comprises a radiation source.

20. A device manufacturing method using a lithographic projection apparatus comprising:
providing a substrate that is at least partially covered by a layer of radiation-sensitive material;
providing a projection beam of radiation;
 patterning the projection beam of radiation with a pattern in its cross-section;
projecting the patterned beam of radiation onto a target portion of the layer of radiation-sensitive material, and

supporting along a support direction one of a support structure of the lithographic projection apparatus, a substrate table of the lithographic projection apparatus and an isolated reference frame of the lithographic projection apparatus with a support member a direction that is substantially perpendicular to the support direction of the support member,

wherein said support member comprises:

a gas-filled pressure chamber, the gas in the pressure chamber acting on a movable member such as to at least partially counteract a force substantially parallel to the support direction, and

a gas evacuating structure constructed and arranged to evacuate gas escaping towards the vacuum chamber through a gap between the movable member and a bearing surface.

21. A device manufactured according to the method of claim 20.

22. A method of supporting a structure in a lithographic apparatus with a support member in a vacuum chamber, the method comprising:

filling with gas at a predetermined pressure a chamber in the support member, acting on a movable member in the support member with the gas such as to at least partially counteract a force with a counteracting force substantially parallel to a support direction, and

evacuating gas escaping towards the vacuum chamber through a gap between the movable member and a bearing surface.

23. A method of supporting a structure according to claim 22, further comprising:

regulating the pressure of the gas in the chamber such that the counteracting force supports at least one of a substrate table and a mask table of said lithographic apparatus.